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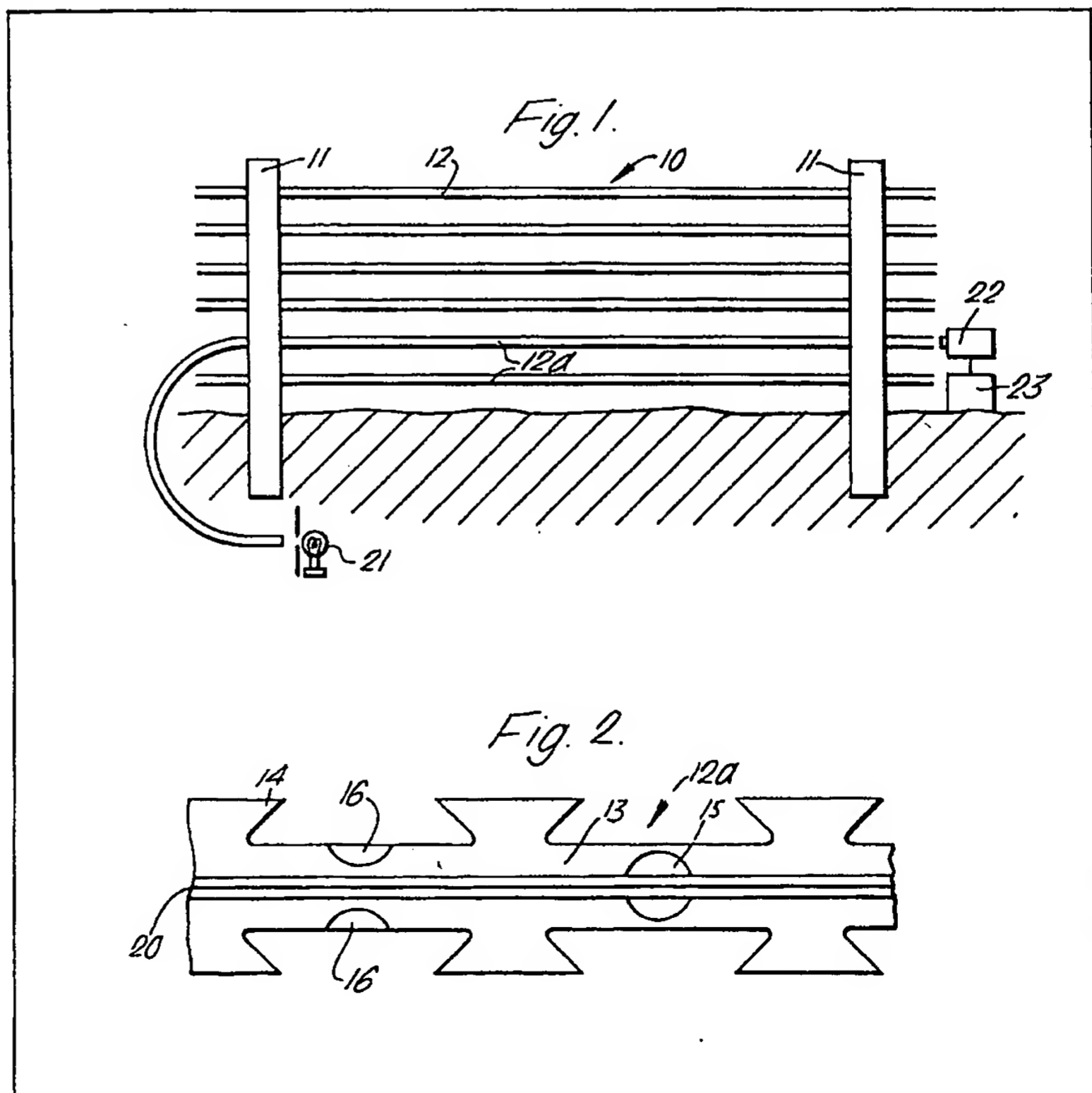
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(12) UK Patent Application (19) GB (11) 2 039 683 A

- (21) Application No 7902098
 (22) Date of filing 19 Jan 1979
 (43) Application published
 13 Aug 1980
 (51) INT CL³
 G08B 13/12
 (52) Domestic classification
 G4N 1D 2E 2W 5A1 5A3
 6B2 FW
 G1A A9 G11 G6 MC R7 S3
 T15 T26 T3 T9
 (56) Documents cited
 GB 1354057
 GB 1203936
 GB 1104565
 GB 714730
 GB 398549
 (58) Field of search
 G4N
 (71) Applicants
 Fibun BV,
 P. O. B. 70492,
 1007 KL,
 Amsterdam,
 Holland.
 (72) Inventors
 Fibun BV
 (74) Agents
 J. Miller & Co.,

(54) Security system

(57) A security system comprises at least one elongated member (12) defining a boundary of an area to be protected, a conductor (20) of electrical or electromagnetic energy carried by member (12), a sensor (22) for sensing energy transmitted through the conductor, and indicator means (23), controlled by sensor (22), for producing an alarm indication. The member (12) has at least one weakened portion (15, 16) such that, when the elongated member is subjected to a predetermined load, the or a weakened portion (15, 16) is subjected to extension or rupture and such extension or rupture causes the indicator means (23) to produce the said alarm indication.



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Fig. 1.

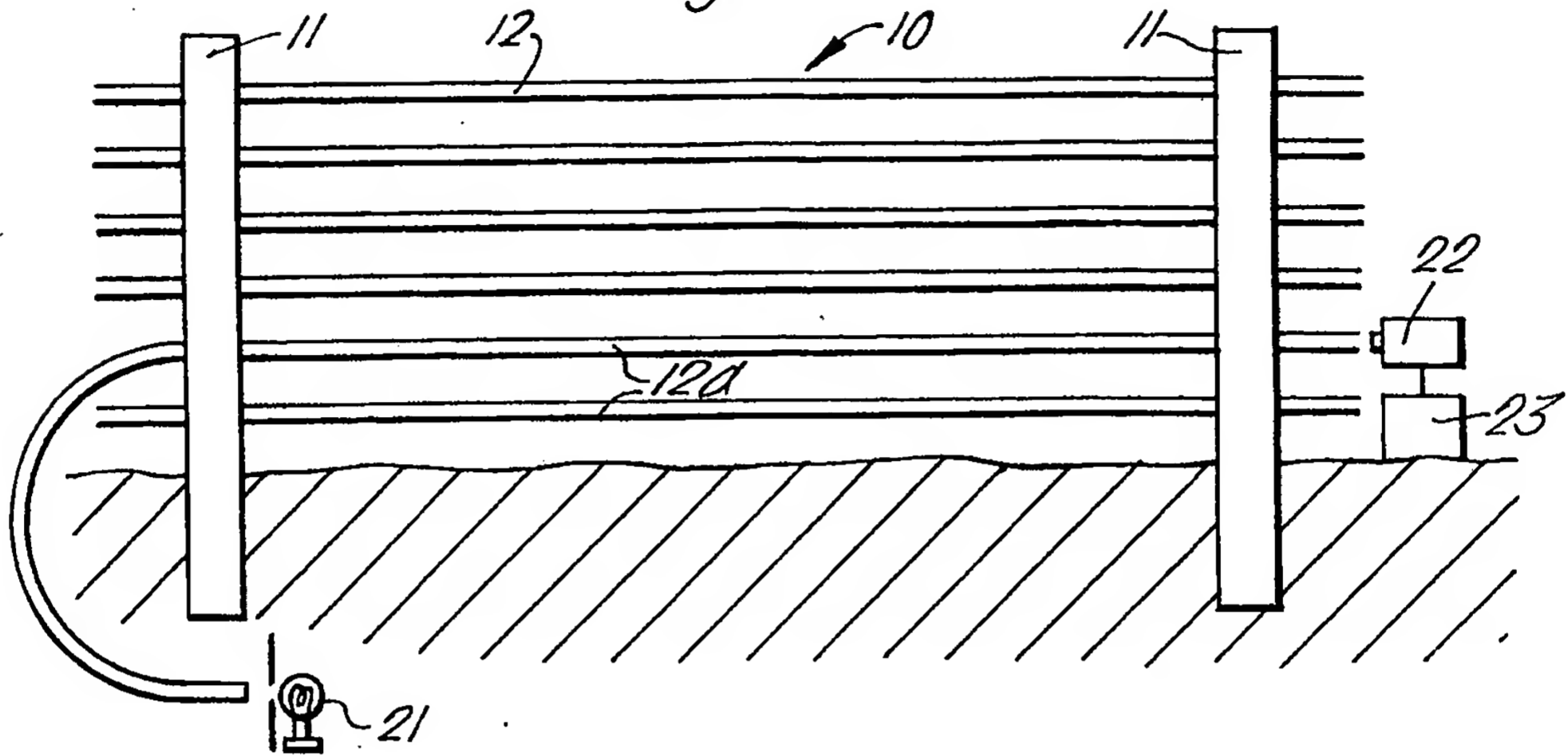


Fig. 2.

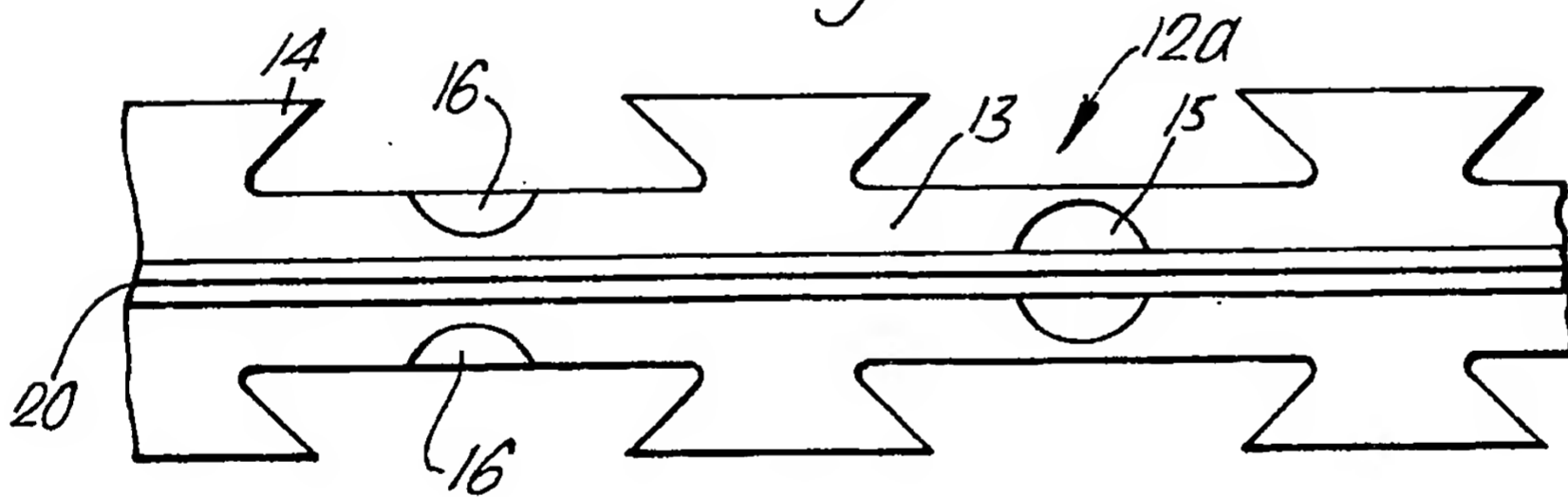


Fig. 3.

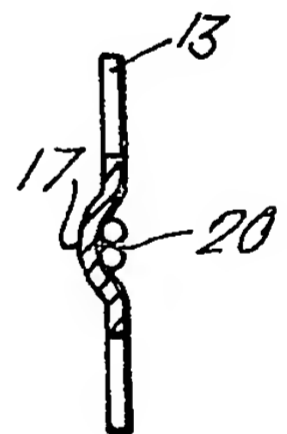
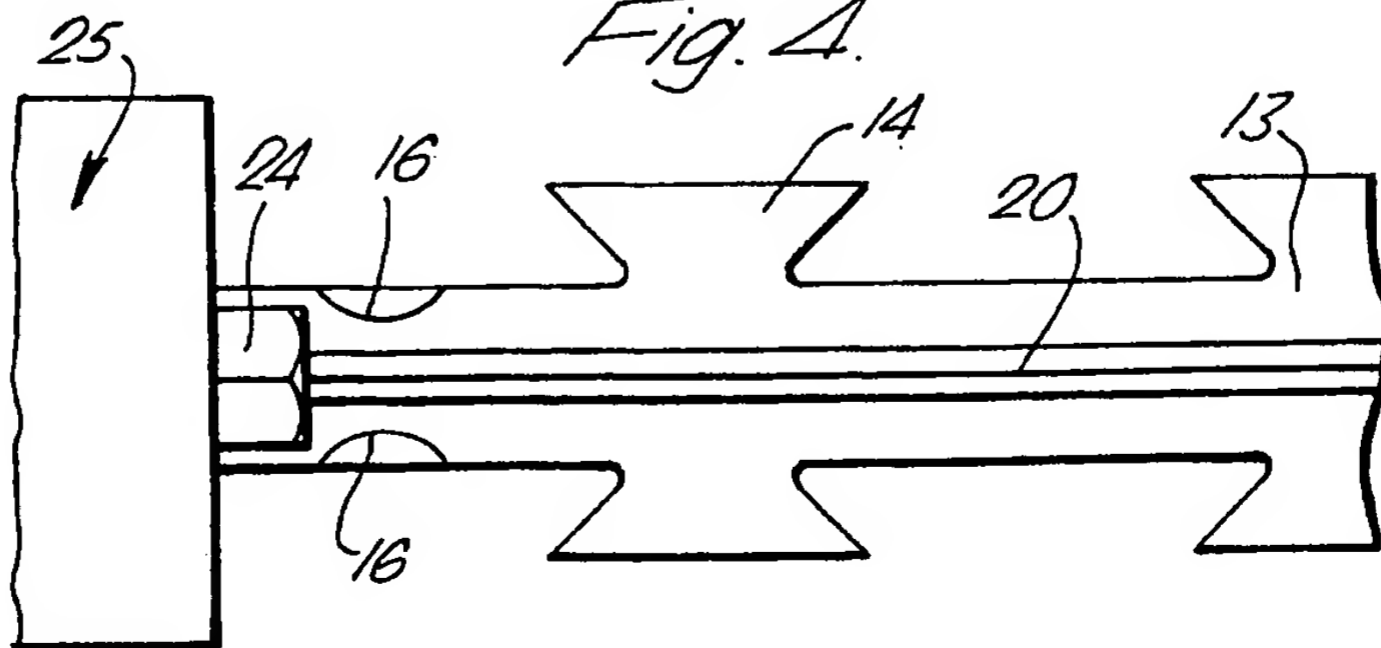


Fig. 4.



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Fig. 5.

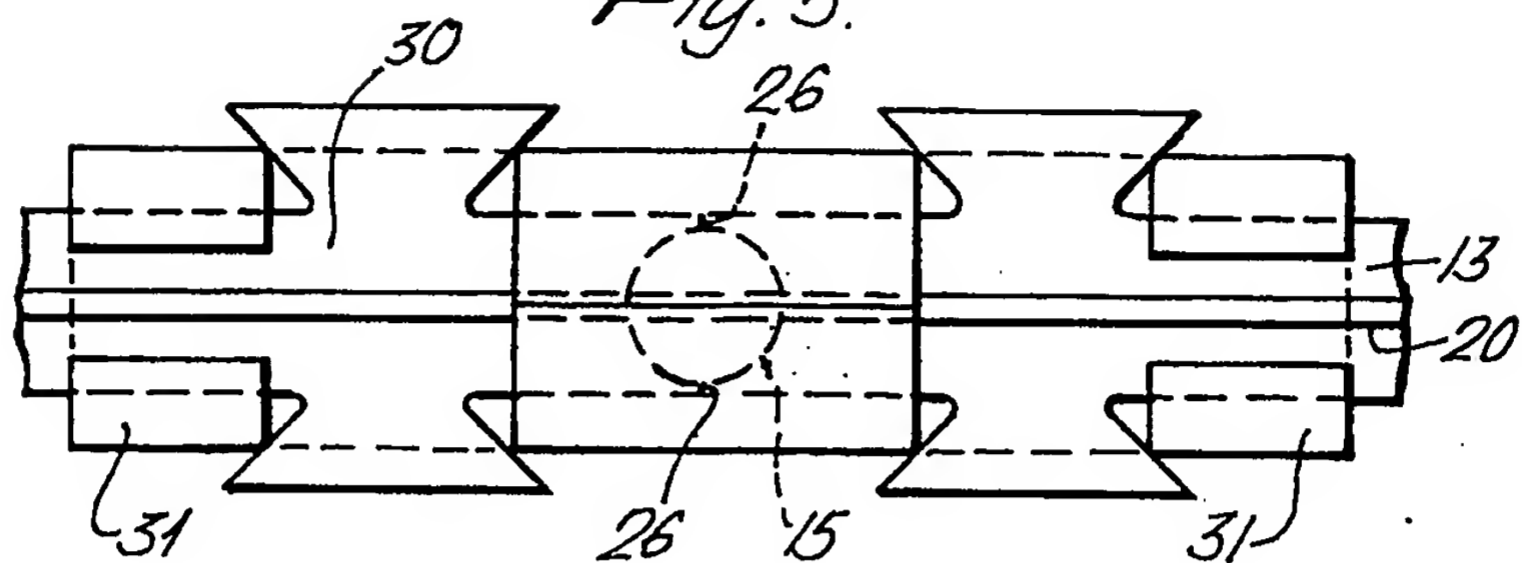


Fig. 6.

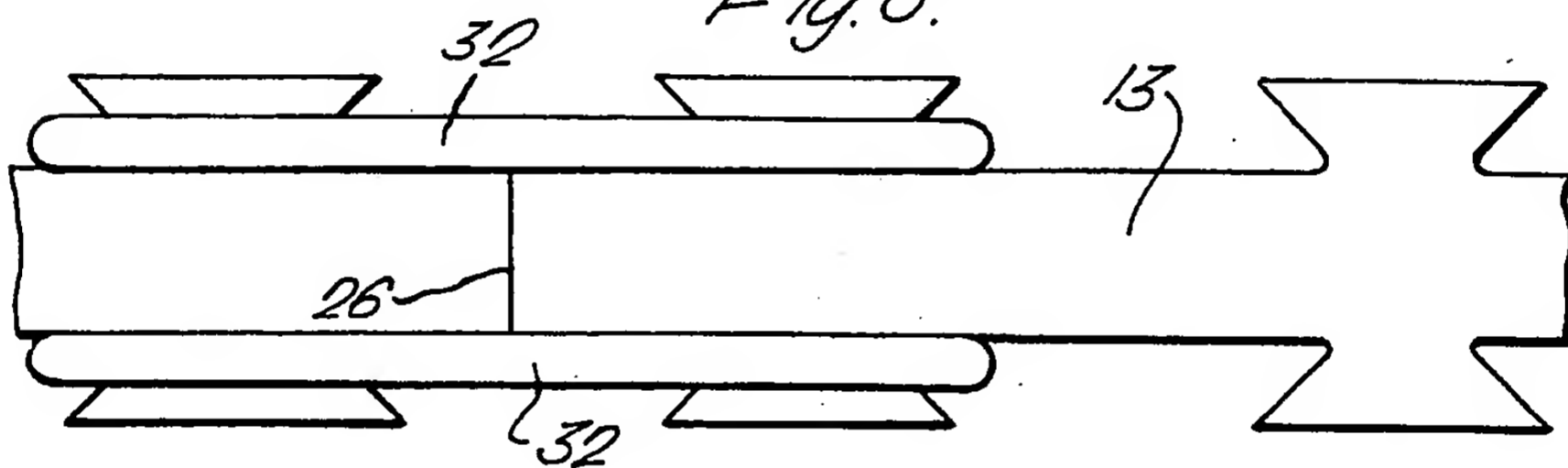
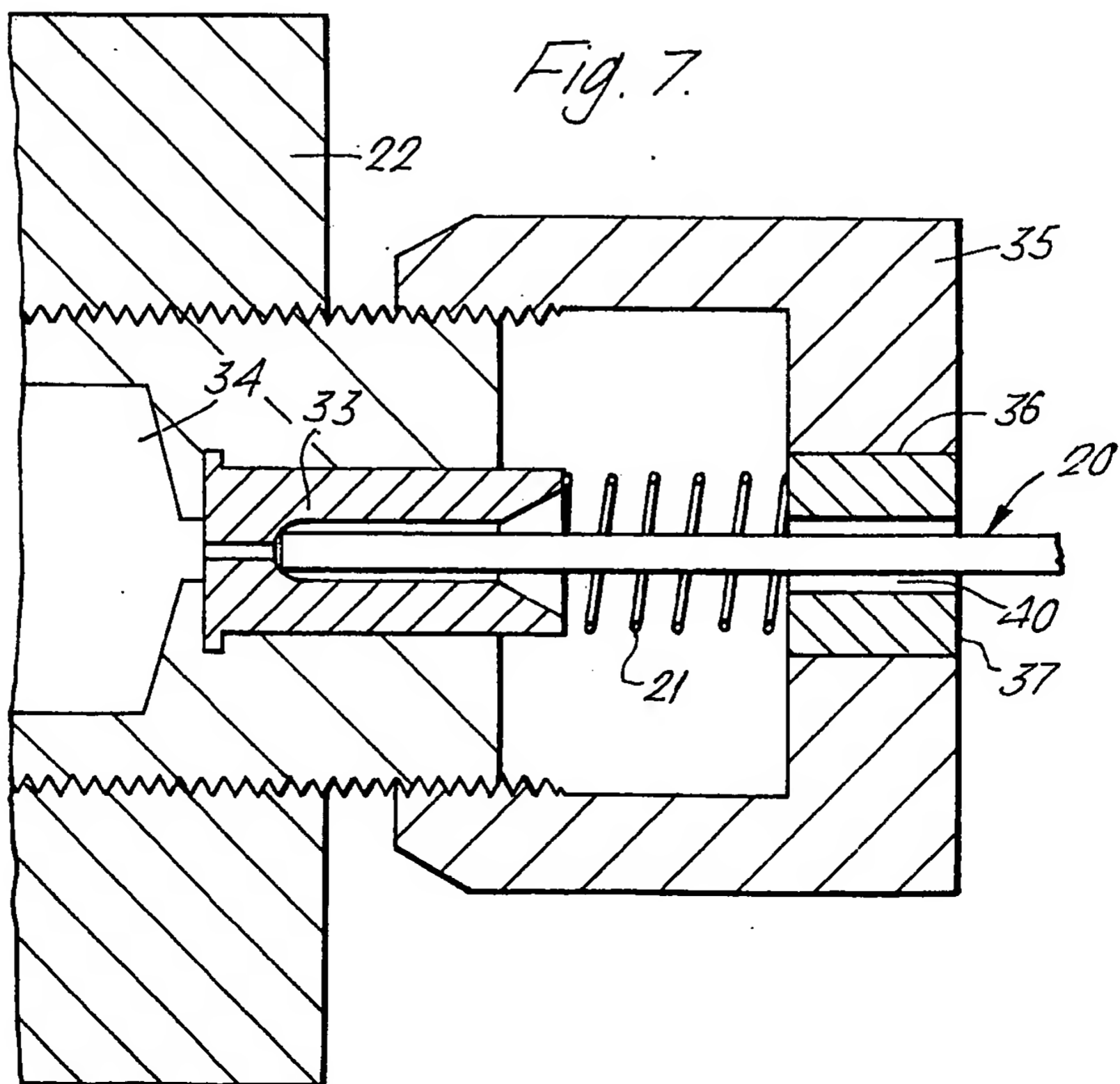


Fig. 7.



SPECIFICATION

Security system

5 This invention concerns a security system.

Security systems are known which comprise a barbed wire fence constituted by a number of strands of barbed wire. Experienced intruders, however, such as trained army personnel, can

10 swiftly surmount such an obstacle without necessarily injuring themselves or damaging the barbed wire fence, and consequently it is not necessarily possible to tell whether such intruders have got over the fence or not.

15 According therefore to the present invention there is provided a security system comprising at least one elongated member defining a boundary of an area to be protected, and indicator means for producing an alarm indication, the security system having at least
20 one weakened portion such that, when the elongated member is subjected to a predetermined load, the or a weakened portion is subjected to extension or rupture and such extension or rupture causes the indicator means to produce the said alarm indication.
25 tion.

In one form of the invention, there are a plurality of elongated members of similar appearance which are adjacent to each other and at least one of which is substantially weaker than the other or another said
30 elongated member, the said weaker elongated member or members constituting the or a said weakened portion.

The said elongated member, or at least one of the elongated members, may have at least one hole
35 and/or recess therein which provides it with a said weakened portion.

Each elongated member may be a barbed member.

The said elongated member, or the said at least
40 one elongated member, may be provided with the said hole and/or recess between and spaced from adjacent longitudinally spaced apart barbs.

The elongated member, or at least one of the elongated members, may be connected to fixed
45 structure at a releasable connection which constitutes the said weakened portion.

The elongated member, or at least one of the elongated members, may be constituted by or may be provided with a conductor of electrical or electro-
50 magnetic energy; there being provided an energy source arranged to transmit electrical or electro-magnetic energy to a first portion of the conductor; and the said indicator means comprising a sensor which is responsive to said energy and which is
55 arranged to receive said energy from a second portion of the conductor.

The or an elongated member may be connected by a releasable connection to the said sensor or to means disposed adjacent to the latter.

60 The hole and/or recess may be provided adjacent the said sensor.

The conductor may be an electrical conductor, or alternatively may be a light conductor and in the latter case may comprise one or more fibre-optic
65 members.

In one form of the present invention, there is provided a security system comprising a plurality of adjacent elongated members of similar appearance which define a boundary of an area to be protected, each elongated member being connected at longitudinally spaced apart connections to support structure; and indicator means, actuated by release of one said connection or by rupture or extension of one of the elongated members between the connections, for producing an alarm indication; the said
70 one elongated member or connection being substantially weaker than the other or another said elongated member or connection so that when the said one elongated member is subjected to a
80 predetermined load it is extended or ruptured and such extension or rupture causes the indicator means to produce the said alarm indication.

In another form of the present invention, there is provided a security system comprising an elongated
85 member which defines a boundary of an area to be protected and which is constituted by or is provided with a conductor of electrical or electro-magnetic energy; a support member which supports the elongated member; an energy source arranged to
90 transmit electrical or electro-magnetic energy to a first portion of the conductor; indicator means comprising a sensor which is responsive to said energy and which is arranged to receive said energy from a second portion of the conductor; and a
95 releasable connection between the conductor and the sensor or between the conductor and means adjacent the sensor; the arrangement being such that when the elongated member is subjected to a predetermined load the releasable connection is
100 released and the indicator means provides an alarm indication.

In yet another form of the present invention there is provided a security system comprising an elongated member which defines a boundary of an area
105 to be protected and which is constituted by or is provided with a conductor of electrical or electro-magnetic energy; support means which support the elongated member; an energy source arranged to transmit electrical or electro-magnetic energy to a
110 first portion of the conductor; indicator means comprising a sensor which is responsive to said energy and which is arranged to receive said energy from a second portion of the conductor; the elongated member having at least one hole and/or recess
115 therein to provide it with a weakened portion; and the arrangement being such that when the elongated member is subjected to a predetermined load the weakened portion is ruptured or extended and this causes the indicator means to provide an alarm
120 indication.

The invention is illustrated, merely by way of example, in the accompanying diagrammatic drawings, in which:-

125 *Figure 1* is a diagrammatic view of a security system according to the present invention,

Figure 2 is a broken-away view of a barbed wire or tape which may be used in the security system of *Figure 1*,

130 *Figure 3* is a cross-sectional view of the barbed wire or tape shown in *Figure 2*,

Figures 4, 5 and 6 show different embodiments of barbed wire or tape which may be used in the security system of Figure 1, and

Figure 7 illustrates a releasable connection between a conductor and a transducer which form part of the security system shown in Figure 1.

In Figure 1 there is shown a security system comprising a fence 10 forming a boundary of an area to be protected. The fence 10 comprises a plurality of horizontally spaced apart posts 11 (only two shown), the posts 11 supporting a plurality of vertically spaced apart elongated members 12 at least one of which, 12a, may be of the form shown in Figure 2.

The elongated member 12a of Figure 2 comprises a barbed wire or tape 13 having a plurality of longitudinally spaced apart barbs 14. The barbed wire or tape 13 may be made of steel which may, for example, be coated with a corrosion-resistant material, e.g. zinc. The barbed wire or tape 13 has at least one weakened portion by virtue of being provided with a hole 15 therethrough and/or with one or more recesses 16, such holes 15 or recesses 16 being disposed between and spaced from adjacent longitudinally spaced apart barbs 14. Thus the barbed wire or tape 13 may be provided, as shown, with two longitudinally aligned recesses 16, and if desired, a hole 15 may be provided between these aligned recesses 16 and spaced therefrom.

The wires or tapes 13 can be provided with the holes 15 and/or recesses 16 during manufacture, or can be provided with such holes or recesses at random intervals by the user before or after installation.

The wire or tape 13 is generally flat but has a curved portion 17 to provide a recess within which are housed two fibre-optic filaments or conductors 20 which cross over any hole 15.

A light source 21 is arranged to transmit visible light or other electro-magnetic energy to one end portion of each conductor 20 of the elongated member 12a. Light transmitted through the conductors 20 is directed onto a sensor 22 which is arranged to actuate a visual or audible alarm indicator 23 when the conductors 20 are extended or broken.

The arrangement is such that when the elongated member 12a is subjected to a predetermined load, e.g. by an intruder standing on it, the weakened portion of the barbed wire or tape 13 constituted by that provided with the hole 15 or that provided with the recess or recesses 16 will be subjected to extension or rupture, and such extension or rupture will cause the signal generated by the sensor 22 to change in such a way as to cause the indicator 23 to produce the necessary alarm indication.

The arrangement could be such that all the elongated members 12 shown in Figure 1 were formed in the same way as the elongated member 12a and were connected to the same or different light sources 21 and to the same or different sensors 22. In this case, of course, the arrangement could be that if an intruder stood on any of the elongated members 12, the required visual or audible alarm would be provided.

Another possibility, however, is to arrange that all the members 12 are of similar appearance but that

the elongated member 12a, which is connected between the light source 21 and the sensor 22, is substantially weaker than the remaining elongated members 12. For example, this may be achieved by arranging that only the elongated member 12a is provided with a said hole 15 or with said recesses 16, while the remaining elongated members 12 are not provided with a hole 15 or with recesses 16 and are therefore substantially stronger. An intruder, who was not aware that one of the elongated members 12 was weaker than the others, would therefore in practice cause extension or rupture of the weakened portion or portions of the elongated member 12a in the course of surmounting the fence 10 and might well suffer injury in the course of doing this and thus be prevented from entering the area to be protected, or at least delayed. Even if he surmounted the fence 10 successfully, the rupture or extension of the said weakened portion would provide an alarm indication. Furthermore, it could easily be arranged that the intruder himself was not aware of the fact that an alarm indication was being given. For example, if the weakened portion of the elongated member 12a were merely such as to cause some extension of the latter, such extension being sufficient to produce the required alarm, then the intruder would merely feel some "give" in the elongated member 12a and this would not cause him to suspect that an alarm had been given.

Additionally, the arrangement could be that a hole or holes 15, and/or a recess or recesses 16, were provided only after the security system had been erected, all the elongated members 12 being originally supplied without a hole or recess therein. Even therefore if the intruder knew the general construction of the security system, he would have to spend some time in locating where such a hole or holes 15 or recess or recesses 16 was provided and this would substantially delay, at the very least, this surmounting of the fence 10. The difficulty of the intruder in this respect could also be increased by first providing the elongated members 12 with the necessary hole or recess, and then filling the hole or recess with a material whose strength is much less than that of the wire or tape 13 but which has the same appearance as the latter so that the location of the hole or recess is difficult or impossible to detect.

It is not of course essential that any of the elongated members 12 is necessarily a barbed member, nor need the conductor 20 necessarily be a light conductor since it could for example be a conventional electrical conductor, in which case the light source 21 would be replaced by a battery or other electrical source.

The elongated members 12 may be connected to the posts 11 to other fixed structure either by fixed connections or by releasable connections. In the latter case, the arrangement may be such that when any of the elongated members 12 is subjected to a predetermined load, the releasable connection between the elongated member 12 and the fixed structure is released. In this case, it may not be necessary to provide either a hole 15 or a recess 16, and the advantage of the construction is that the break in the system occurs at a predetermined point

such that a repair can easily be effected subsequently and without the use of special jointing pieces.

A particularly convenient location for such a connection between an elongated member 12 and the fixed structure is provided by connecting the elongated member 12 by a releasable connection either to the sensor 22 itself, or to a member disposed immediately adjacent to the sensor 22. Moreover, in this case it may be arranged that a hole 15, and/or a recess 16, is provided adjacent to the sensor 22.

The provision of the hole or holes 15 and/or recess or recesses 16 enables the fence 10 to be prepared so as to be as sensitive as required for a particular function and location at which it is installed.

In Figures 4 to 6 there is shown wires or tapes which may be used in substitution for that shown in Figures 2 and 3. The wires or tapes shown in Figures 4 to 6 are generally similar to that of Figures 2 and 3 and for this reason will not be described in detail, like reference numerals indicating like parts.

In the Figure 4 construction, however, the conductors 20 are connected by a releasable connection 24 to a coupling of transducer box 25 which forms part of the sensor 22. The wire or tape 13 moreover, is provided with aligned recesses 16 which are disposed immediately adjacent to the releasable connection 24.

In the arrangement shown in Figure 5, the wire or tape 13 is completely severed by means of a cut 26 extending into a hole 15, although such severance of the wire or tape 13 does not sever the conductors 20 which pass across the hole 15. A break jointing piece 30, having lugs 31, is then placed in position over the part of the wire or tape 13 provided with the cut 26, and the lugs 31 are bent back over the wire or tape 13. Thus the strength of the wire or tape 13 will depend upon the strength of the break jointing piece 30 and, when the latter is broken in use, the arrangement can be that the conductors 20 are merely subjected to extension and do not themselves break, although they do cause an alarm to be actuated. Consequently, after such breaking of the break jointing piece 30, it is a simple matter to replace the broken piece 30 by a new piece 30. The piece 30 can be constituted by thin gauge metal or by a plastics member.

In the arrangement shown in Figure 6, the wire or tape 13 is cut through (apart from the conductor 20) by a cut 26, and the separate parts of the wire or tape 13 are interconnected by coupling wires or springs 32 of controlled breaking strength or extension capability.

As will be appreciated, in all cases when calculating the desired breaking strain, it is important to take into consideration the strength of the conductor or conductors 20.

In Figure 7 there is shown part of a security system according to the present invention in which a light conductor 20 of one of the elongated members has an end portion mounted in a bush 33 which is disposed in contact with a transducer 34 forming part of the sensor 22. The bush 33 is mounted within a housing 35 having an aperture 36 within which is mounted a releasable plug 37. the releasable plug 37

has a bore 40 through which the conductor 20 extends, a spring 41 being disposed between the plug 37 and the bush 33. The plug 37 is an interference fit in the housing 35 but will be extracted from the latter before the conductor 20 breaks. That is to say, if the elongated member 12 which is provided with the conductor 20 is subjected to a predetermined load, this will increase the load on the spring 21 and the plug 37 will be extracted from the housing 35 before the conductor 20 breaks.

CLAIMS

1. A security system comprising at least one elongated member defining a boundary of an area to be protected, and indicator means for producing an alarm indication, the security system having at least one weakened portion such that, when the elongated member is subjected to a predetermined load, the or a weakened portion is subjected to extension or rupture and such extension or rupture causes the indicator means to produce the said alarm indication.

2. A system as claimed in claim 1 in which there are a plurality of elongated members of similar appearance which are adjacent to each other and at least one of which is substantially weaker than the other or another said elongated member, the said weaker elongated member or members constituting the or a said weakened portion.

3. A system as claimed in claim 1 or 2 in which the said elongated member, or at least one of the elongated members, has at least one hole and/or recess therein which provides it with a said weakened portion.

4. A system as claimed in any preceding claim in which the or each elongated member is a barbed member.

5. A system as claimed in claim 3 and in claim 4 in which the said elongated member, or the said at least one elongated member, is provided with the said hole and/or recess between and spaced from adjacent longitudinally spaced apart barbs.

6. A security system as claimed in any preceding claim in which the elongated member, or at least one of the elongated members, is connected to fixed structure at a releasable connection which constitutes the said weakened portion.

7. A system as claimed in any preceding claim in which the elongated member, or at least one of the elongated members, is constituted by or is provided with a conductor of electrical or electro-magnetic energy; there being provided an energy source arranged to transmit electrical or electro-magnetic energy to a first portion of the conductor; and the said indicator means comprising a sensor which is responsive to said energy and which is arranged to receive said energy from a second portion of the conductor.

8. A system as claimed in claim 6 and in claim 7 in which the or an elongated member is connected by a releasable connection to the said sensor or to means disposed adjacent to the latter.

9. A system as claimed in claim 3 and in claim 7 in which the hole and/or recess is provided adjacent

the said sensor.

10. A system as claimed in any of claims 7-9 in which the conductor is an electrical conductor.

11. A system as claimed in any of claims 7-9 in which the conductor is a light conductor.

12. A system as claimed in claim 11 in which the light conductor comprises one or more fibre-optic members.

13. A security system comprising a plurality of adjacent elongated members of similar appearance which define a boundary of an area to be protected, each elongated member being connected at longitudinally spaced apart connections to support structure; and indicator means, actuated by release of one said connection or by rupture or extension of one of the elongated members between the connections, for producing an alarm indication; the said one elongated member or connection being substantially weaker than the other or another said elongated member or connection so that when the said one elongated member is subjected to a predetermined load it is extended or ruptured and such extension or rupture causes the indicator means to produce the said alarm indication.

14. A security system comprising an elongated member which defines a boundary of an area to be protected and which is constituted by or is provided with a conductor of electrical or electro-magnetic energy; a support member which supports the elongated member; an energy source arranged to transmit electrical or electro-magnetic energy to a first portion of the conductor; indicator means comprising a sensor which is responsive to said energy and which is arranged to receive said energy from a second portion of the conductor; and a releasable connection between the conductor and the sensor or between the conductor and means adjacent the sensor; the arrangement being such that when the elongated member is subjected to a predetermined load the releasable connection is released and the indicator means provided an alarm indication.

15. A security system comprising an elongated member which defines a boundary of an area to be protected and which is constituted by or is provided with a conductor of electrical or electro-magnetic energy; support means which support the elongated member; an energy source arranged to transmit electrical or electro-magnetic energy to a first portion of the conductor; indicator means comprising a sensor which is responsive to said energy and which is arranged to receive said energy from a second portion of the conductor; the elongated member having at least one hole and/or recess therein to provide it with a weakened portion; and the arrangement being such that when the elongated member is subjected to a predetermined load the weakened portion is ruptured or extended and this causes the indicator means to provide an alarm indication.

16. A security system substantially as hereinbefore described with reference to and as shown in Figure 1 taken in association with any of the other accompanying drawings.

March 1980

Superseded claims 1-16

New or amended claims:- 1-12

1. A security system comprising an elongated member defining a boundary of an area to be protected; a conductor of electrical or electro-magnetic energy carried by said elongated member; transmitting means for transmitting electrical or electro-magnetic energy through said conductor; a sensor for sensing energy transmitted through said conductor; and indicator means, controlled by the sensor, for producing an alarm indication; the elongated member having at least one weakened portion such that, when the elongated member is subjected to a predetermined load, the or a weakened portion is subjected to extension or rupture, and such extension or rupture causes the indicator means to produce the said alarm indication.

2. A system as claimed in claim 1 in which there are a plurality of elongated members of similar appearance which are adjacent to each other and at least one of which is substantially weaker than the other or another said elongated member, the said weaker elongated member or members constituting the or a said weakened portion.

3. A system as claimed in claim 1 or 2 in which the said elongated member, or at least one of the elongated members, has at least one hole and/or recess therein which provides it with a said weakened portion.

4. A system as claimed in claim 3 in which the hole and/or recess is provided adjacent the said sensor.

5. A system as claimed in any preceding claim in which the or each elongated member is a barbed member.

6. A system as claimed in claim 3 and in claim 4 in which the said elongated member, or the said at least one elongated member, is provided with the said hole and/or recess between and spaced from adjacent longitudinally spaced apart barbs.

7. A security system as claimed in any preceding claim in which the elongated member, or at least one of the elongated members, is connected to fixed structure at a releasable connection.

8. A system as claimed in claim 7 in which the or an elongated member is connected by a releasable connection to the said sensor or to means disposed adjacent to the latter.

9. A system as claimed in any preceding claim in which the conductor is an electrical conductor.

10. A system as claimed in any preceding claim in which the conductor is a light conductor.

11. A system as claimed in claim 10 in which the light conductor comprises one or more fibre-optic members.

12. A security system substantially as hereinbefore described with reference to and as shown in Figure 1 taken in association with any of the other accompanying drawings.